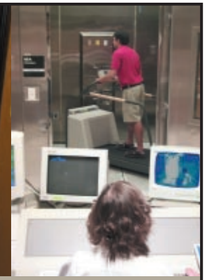
Using EPA's Human Studies Facility

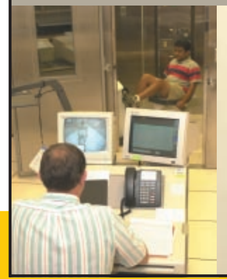
To use the facilities, non-EPA scientists must complete an Outside User Agreement with EPA. The research must be developed to address the needs of the outside user rather than those of EPA. Reimbursement is required for all facilities used and services provided. Proposed studies must be in the public interest, have a current Institutional Review Board (IRB) approval, be in accord with the Common Rule, and are subject to Agency review.



Other Resources

EPA's Human Studies Facility contains participant training rooms and medical telemetric electrocardiographic monitoring equipment. In addition to the full complement of exercise and lung function measurement equipment found in the exposure chambers, the training rooms contain body plethysmographs for measuring changes in lung volume, airway resistance, and carbon monoxide (CO) diffusing capacity. The telemetric monitoring equipment allows participants to be monitored continuously by medical and research technicians while they are in the facility.

Participant recruitment is available, as is a facility for conducting clinical procedures. Medical support for clinical procedures is available through contract mechanisms. Chamber operation and maintenance are provided through an on-site contractor.



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EPA United States Environmental Protection Agency

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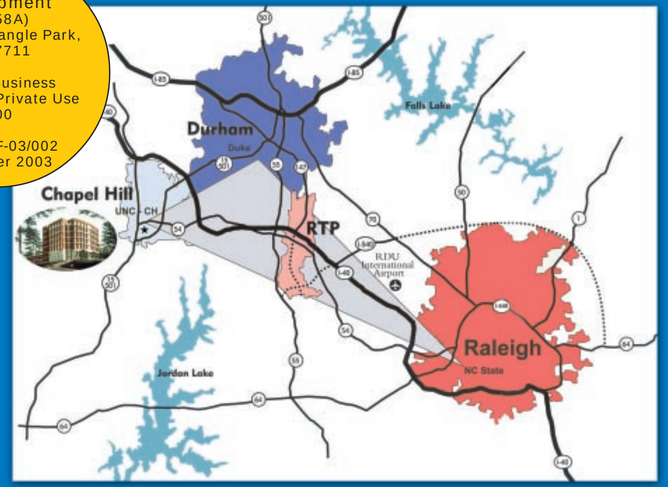

Contact:

Scientists interested in using the facility should contact:
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EPA's Human Studies Facility

at Chapel Hill

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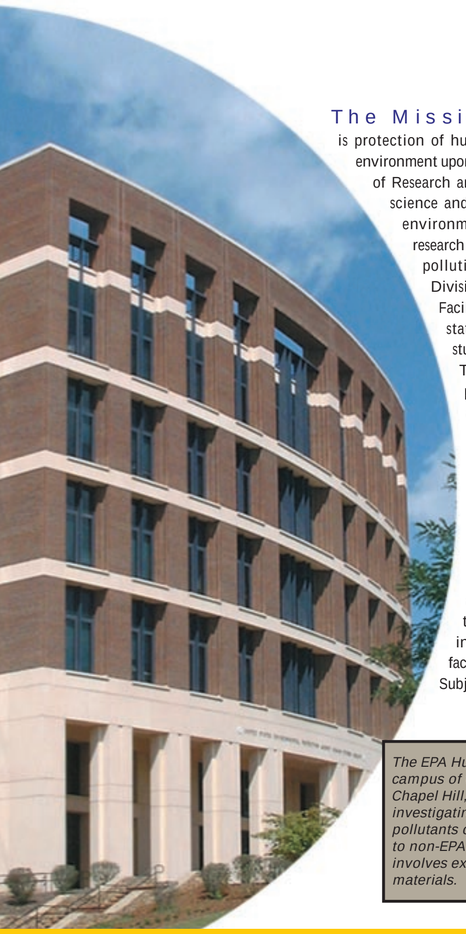


The Mission of the EPA

is protection of human health and safeguarding the natural environment upon which life depends. Within EPA, the Office of Research and Development provides the high quality science and technical support necessary for informed environmental decision-making. Conducting the research needed to understand the human response to pollution is the mission of the Human Studies Division, which is located in the Human Studies Facility. This facility is distinguished by unique, state-of-the-art exposure systems designed for studying the health effects of airborne pollutants. The chambers can deliver most gaseous pollutants at precise concentrations and atmospheric conditions. Instrumentation enables researchers to measure pollutant induced changes in lung function and heart rate variability. In addition to gaseous pollutants, exposures to particles can be studied using an ambient air concentrator. The Human Studies Facility is primarily intended for research to support EPA standards and regulations, but scientists not affiliated with EPA may use these chambers to conduct research that is in the public interest. All research conducted using these facilities is in accord with the Common Rule for Subject Protection.

The EPA Human Studies Facility, located on the campus of the University of North Carolina at Chapel Hill, contains unique research equipment for investigating the potential health effects of air pollutants on humans. These facilities are available to non-EPA scientists conducting research that involves exposing human volunteers to airborne materials.

Rochester Style Exposure Chambers

Five of the chambers are Rochester style, employing well-mixed and turbulent air. Their construction features stainless steel surfaces throughout, including wall and door panels and inlet ducts. Wall and door panels are built with foam-in-place polyurethane insulation (R-34) and are available in large (~295 square feet, with restrooms) and small (~56 square feet) configurations.

Large Chamber Specifications

- Air flow: 2,000 to 4,000 cfm (+/- 0.5%), 20 to 40 air changes per hour
- Temperature: 45 to 90˚F (+/- 2˚F)
- Relative humidity: 25 to 75% (+/- 5%)

Small Chamber Specifications

- Air flow: 245 to 680 cfm (+/- 0.5%), 14 to 40 air changes per hour
- Temperature: 62 to 82˚F (+/-2˚F)
- Relative humidity: 40 to 60% (+/-5%)

Existing pollutant delivery capabilities include ozone, sulfur dioxide, nitrogen dioxide, and volatile organic compounds (VOCs). A wide range of other gaseous pollutants can be used, singularly or in combination, so long as they can be controlled and measured with commercially available equipment and are compatible with the stainless steel surfaces of the chambers. Each chamber can be equipped with exercise treadmills, spirometers for measuring basic lung function, minute ventilation systems for determining breathing patterns and other respiratory parameters, and telemetry for recording the electrocardiogram.

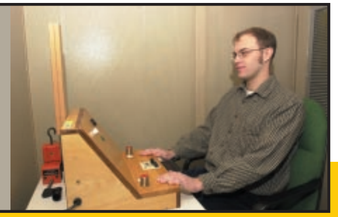
Audiometric Isolation Rooms

Four chambers are audiometric isolation rooms used to investigate the effects of gaseous pollutants on activities requiring high levels of mental concentration. These chambers are constructed as two pairs; each pair contains a clean air control room and an exposure room. These chambers employ 100% makeup air and are approximately 60 square feet.

Existing pollutant delivery capability includes carbon monoxide and VOCs, but most other gaseous pollutants can be delivered if measurement and delivery equipment are commercially available and the substance is compatible with construction materials.

Audiometric Isolation Room Specifications

- Air flow: 120 to 240 cfm (+/- 1.0%), 20 to 40 air changes per hour
- Temperature: 60 to 90˚F, +/- 2˚F
- Relative humidity: 30 to 75%, +/- 5%
- Pollutant concentration: within 5% of set point
- Noise Levels: 63HZ, 52db; 125HZ, 36db; 1000HZ, 27db; 4000HZ, 25db; 8000HZ, 31db



Concentrated Air Particle System

Developed to support EPA's particulate matter research program, the aerosol concentrator exposure system consists of a high-volume, size-selective inlet, a three-stage virtual impactor, a diluter-conditioner, a 4'x8' exposure chamber, and inlet and outlet exposure monitoring equipment. During operation, outside air is brought in through a size-selective inlet where particles between 0.1 and 2.5 microns are inertially separated, producing a concentrated airstream that is subsequently diluted with ultra-clean, conditioned air and delivered to the human exposure chamber. Because the system is vacuum operated, the chamber functions at a static pressure of approximately negative 10 inches of water. The airstream can be monitored for particle mass and size, and samples can be collected for later analysis.

The Concentrated Air Particle System (CAPS) concentrates outside ambient air particles by a factor of six to eight. Particles range in size from 0.1 to 2.5 microns. Ozone and nitrogen dioxide are available as additives.

In Vitro Chamber Exposure Systems

To complement the capabilities offered by the *in vivo* systems, four *in vitro* exposure systems are available. Each system consists of small, paired exposure chambers housed in incubators whose temperature, humidity and carbon dioxide levels can be controlled. One chamber of each pair functions as a cell culture exposure chamber for the same pollutants used in the clinical chambers; the other serves as a clean air control. Pollution generation and chamber control systems are computer controlled and monitored using real-time analyzers.

Chamber Supply Air

For all chambers, ultra-clean air is produced by three custom-designed air cleaning units, each supplying 5500 cfm. Incoming ambient air is processed by

- charcoal filtration to remove hydrogen sulfide, VOCs, and ozone to 50 ppb or less,
- desiccant dehumidification to a dewpoint of -18˚F,
- chemisorbent filtration to remove oxides of sulfur and nitrogen to 50 ppb or less, and
- catalytic conversion to 450˚F to remove hydrocarbons to 5 ppb or less.

Multiple particle filters are employed, including final HEPA filtering to remove particles 0.3 microns and larger.